

SCMA and CMA Series

Single Channel VHF and UHF Preamplifiers



SCMA

The SCMA and CMA-b Single Channel Preamplifier Series are professional quality, very low noise, single channel VHF/FM and UHF preamplifiers. Both the SCMA and CMA-b are optimized for a single VHF channel or FM Band (88-108 MHz), while the SCMA-Ub is optimized for a single UHF channel. These preamplifiers can accept a wide range of input signal levels and offer excellent gain, making these units ideal for difficult signal areas. The SCMA-Ub has an internal trap that can be factory tuned to a customer specified UHF frequency to prevent overload or intermodulation interference from strong, local channels.

The SCMA/CMA-b Single Channel Preamplifier Series are housed in a die-cast case. Input, output, and test ports are 75 ohm, type "F" female connectors. A 5/8" entry adapter is supplied on the SCMA Series (only) to allow use of a 0.500 or 0.750 aluminum cable connector. The preamplifiers mount on a 1.5 inch O.D. (max) antenna mast with the supplied mounting hardware. Blonder Tongue PS Series -21 VDC power supplies (available separately) are used to power the preamplifiers through the downleads.

○ Features & Benefits

- Low Noise Figure
- Excellent Gain and Response Flatness
- Superior Adjacent Channel Overload Rejection
- Output Test Port for Uninterrupted Service Testing
- Ideal For All BTY Series Single Channel Antennas
- SCMA Series has its Guaranteed Noise Figure Stamped on the Case

○ Specifications

	SCMA	SCMA-Ub	CMA-b
Electrical			
Noise Figure (dB):	3.7, max (2-6) 3.0 max (FM) 2.5, max (7-13)	2.5 (14-69)	3.5 (2-6) 2.0 (FM) 2.5 max (7-13)
Trap Depth:	NA	10 dB	NA
Gain (dB):	27 (2-6), 24 (FM), 25 (7-13)	25 (14-34), 24 (35-69)	29 (2-6), 24 (FM), 26 (7-13)
Bandwidth:	6, 20 (FM)	6	6, 20 (FM)
Bandpass Flatness (dB): (FM)	±0.25 (2-13), 1.0 (FM)	±0.75	±0.25 (2-13), 1.0
Selectivity (dB):	12	12	12
Minimum Recommended Input Level (dBmV):	-10	-10.5	-10
Input Capability (dBmV):	+35	+35	+35
Impedance - All Ports (Ohm):	75	75	75
General			
Power Requirements:	-21 VDC @ 65 mA	-21 VDC @ 29 mA	-21 VDC @ 40 mA
Recommended BT Power Supply:	PS-1536	PS-1526	PS-1526
Temperature Range (°C):	-40 to +60	-40 to +60	-40 to +60
Mechanical			
Max. Mast Diameter (O.D.) (in):	1.5	1.5	1.5
Dimensions (WxdxbD in.): (WxdxbD mm):	5.13 x 5.25 x 3.50 130 x 133 x 89	5.00 x 3.88 x 3.00 127 x 99 x 76	5.00 x 3.88 x 2.31 127 x 99 x 59
Weight (lbs): (kg):	1.31 0.60	1.31 0.60	1.31 0.60
Connectors (Common to All)			
Input:	"F" type, female "F" type, female "F" type, female		
Output:			
Test:			

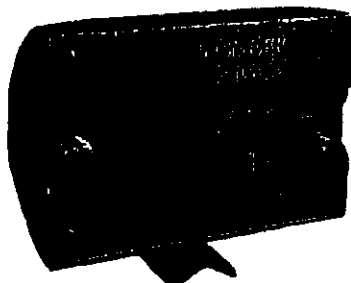
○ Ordering Information

Model	Stock No.	Description
SCMA	4761	Preamplifier Single Channel VHF/FM, 54-216MHz (a)
SCMA-Ub	4426	Preamplifier Single Channel UHF, 470-806MHz (a)
CMA-B	4706	Preamplifier Single Channel VHF/FM, 54-216MHz (a)
PS-1526	1526	Power Supply Single Output, -21VDC @ 48mA
PS-1536	1536	Power Supply Dual Output, -21VDC @ 100mA

(a) Specify channel when ordering

CMA Series

Broadband VHF and UHF Preamplifiers



The CMA Broadband Preamplifier Series includes professional quality, low noise, broadband VHF & UHF preamplifiers. CMA's are available in four different models for amplification of low band VHF, high band VHF, broadband VHF, or broadband UHF. The CMA Series are housed in a die-cast case. Input, output, and test ports are 75 ohm, type "F" female connectors. The CMA's mount on a 1.5 inch O.D. (max) antenna mast with the supplied mounting hardware. Blonder Tongue PS Series -21 VDC power supplies(available separately) are used to power the preamplifiers through the downleads.

○ Features & Benefits

- Low Noise Figure
- Output Test Port for Uninterrupted Service Testing
- High Gain and Input Capability
- Ideal For All BTY Series Broadband Antennas

○ Specifications

	CMA-LB	CMA-HB	CMA-BB	CMA-Uc
Electrical				
Frequency Range (MHz):	54-88 (2-6)	174-216 (7-13)	54-216 (2-13)	470-806 (14-69)
Noise Figure (dB):	5.0	5.0	5.0	3.0
Gain (dB):	26	26	26	20
Bandpass Flatness (dB):	±0.5	±0.5	±0.7	±1.5
Min. Recommended Input Level (dBmV):	-7	-7	-7	-9
Input Capability (dBmV):	+28	+26	+25	+26
Impedance - All Ports (Ohm):	75	75	75	75
Input Return Loss (dB):	10	12	11	-
Output Return Loss (dB):	11	9	8	-
General				
Power Requirements:	-21 VDC @ 50 mA	-21 VDC @ 50 mA	-21 VDC @ 50 mA	-21 VDC @ 29 mA
Recommended BT Power Supply:	PS-1536	PS-1536	PS-1536	PS-1526
Temperature Range (°C):	-40 to +60	-40 to +60	-40 to +60	-40 to +60
Mechanical				
Maximum Mast Diameter (O.D.) in.:	1.5	1.5	1.5	1.5
Dimensions				
WxHxD in.:	5.13 x 5.25 x 3.50	5.13 x 5.25 x 3.50	5.13 x 5.25 x 3.50	5.00 x 3.88 x 3.00
WxHxD mm:	130 x 133 x 89	130 x 133 x 89	130 x 133 x 89	127 x 99 x 76
Weight				
lbs.:	1.50	1.50	1.50	1.31
mm:	0.68	0.68	0.68	0.60
Connectors (Common to All)				
Input:	"F" type, female			
Output:	"F" type, female			
Test:	"F" type, female			

○ Ordering Information

Model	Stock No.	Description
CMA-BB	4448 BB	Preamplifier Broadband VHF, 54-216MHz
CMA-HB	4448 HB	Preamplifier Broadband High Band VHF, 174-216MHz
CMA-LB	4448 LB	Preamplifier Broadband Low Band VHF, 54-88MHz
CMA-UC	1264	Preamplifier Broadband UHF, 470-806MHz
PS-1526	1526	Power Supply Single Output, -21VDC @ 48mA
PS-1536	1536	Power Supply Dual Output, -21VDC @ 100mA

PS Series

Preamplifier Power Supplies



PS-1526



PS-1536

○ Features & Benefits

- Single Output, 40mA Capacity
- Regulated and Surge Protected
- Auxiliary AC Receptacle

The PS-1526 and PS-1536 are professional quality, DC power supplies designed to power SCMA and CMA Series antenna preamplifiers. Both units provide -21 VDC and allow for a combined VHF and UHF feed to be diplexed with the power feed. The PS-1536 has a dual output for powering two loads, with a maximum current rating of 100 mA. The PS-1526 has a single output for powering one load, with a maximum current rating of 40 mA.

The PS-1526 and PS-1536 are housed in an aluminum case with an auxiliary AC receptacle. Both units offer regulated and surge-protected power. The PS-1536 has a panel mounted fuse, provides an additional level of short circuit protection on the regulator and a clamped output voltage to protect connected loads.

○ Specifications

PS-1536

RF

Thru-Line Insertion Loss

VHF (10-300 MHz): 0.2 dB

UHF (470-806 MHz): 0.2 dB

Thru-Line Return Loss

VHF (10-300 MHz): 20 dB

UHF (470-890 MHz): 20 dB

Isolation Between Outputs:

10-700 MHz: 50 dB

700-806 MHz: 35 dB

Impedance: 75 Ω

Electrical

Output Voltage: -21 VDC

Current @ 105 VAC Input: 100 ma

General

Power Requirements:

117 VAC, $\pm 10\%$,

60 Hz, 0.11 A

Temperature Range: 0 to +50 °C

Mechanical

Dimensions (WxDxH):

8.25 x 3.50 x 2.25 in.

210 x 89 x 57 mm

Weight: 2.00 lbs, 0.91 kg

Connectors

Input: "F" type, female

Output + DC: "F" type, female

PS-1526

RF

Thru-Line Insertion Loss

VHF (10-300 MHz): 0.3 dB

UHF (470-806 MHz): 0.5 dB

Thru-Line Return Loss

VHF (10-300 MHz): 26 dB

UHF (470-890 MHz): 22 dB

Impedance: 75 Ω

Electrical

Output Voltage: -21 VDC

Current @ 105 VAC Input: 40 ma

General

Power Requirements:

117 VAC, $\pm 10\%$,

60 Hz, 0.07 A

Temperature Range: 0 to +50 °C

Mechanical

Dimensions (WxDxH):

4.75 x 3.25 x 2.75 in.

121 x 83 x 70 mm

Weight: 1.25 lbs, 0.57 kg

Connectors

Input: "F" type, female

Output + DC: "F" type, female

○ Ordering Information

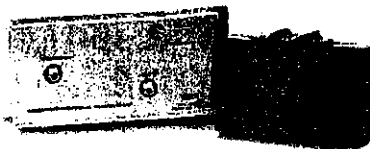
Model	Stock No.	Description
PS-1526	1526	Power Supply Single Output, -21VDC @ 40mA
PS-1536	1536	Power Supply Dual Output, -21VDC @ 100mA

Galaxy III and Galaxy III Plus

Consumer Broadband Preamplifiers



GALAXY III Series



GALAXY III Plus Series

The GALAXY III Series are quality broadband antenna preamplifiers designed for residential consumer applications. The preamplifier's case is designed to mount on the antenna mast in close proximity to the receiving antenna for best performance. A compact indoor transformer and power adder are included with all models. The GALAXY III Series features lightning and surge protection and a high impact polypropylene case for long service life. Many UHF and UHF/VHF models are available, including units with 300 or 75 ohm, single or dual outputs. Each preamplifier is individually packaged in a display box and includes complete mast mounting hardware.

○ Features & Benefits

- UHF/VHF and UHF Models
- Low Noise Figure
- Split Band Amplification for Maximum Dynamic Range and Overload Protection
- Dual Output Port Models with Built-in Splitter For Two Set Hookups
- Single or Dual Input Models for Combined or Separate UHF and VHF Antenna Installations
- Lightning and Surge Protected
- High Impact Plastic Enclosure

○ Specifications

	Input Impedance (ohm)	Output Impedance (ohm)	Frequency Band (dB)	Amplifier Gain (dB)	Noise Figure
VHF					
HORIZON III	1-300	1-300	LB (2-6) HB (7-13)	14 14	5.0 4.0
SKYLINER III PLUS	1-300	1-75	LB (2-6) HB (7-13)	31 31	5.0 4.0
UHF					
ABLE U2 III	1-300	1-300	UHF (14-69)	19	3.3
ABLE U2 III 75	1-300	1-75	UHF (14-69)	20	3.5
ABLE U2 III 75-75	1-75	1-75	UHF (14-69)	20	3.5
UHF/VHF					
CROSS COUNTRY III	1-300	1-300	LB (2-6) HB (7-13) UHF (14-69)	14 14 19	5.0 5.0 3.5
SUBURBAN III	1-300	1-75	LB (2-6) HB (7-13) UHF (14-69)	15 15 19	5.0 5.0 4.0
SUBURBAN III PLUS	1-300	1-75	LB (2-6) HB (7-13) UHF (14-69)	31 31 37	5.0 5.0 5.0
VOYAGER III	1-300	1-300	LB (2-6) HB (7-13) UHF (14-69)	14 16 18	5.0 5.0 3.3
VOYAGER III DUAL	1-300	2-300	LB (2-6) HB (7-13) UHF (14-69)	14 16 18	5.0 5.0 3.3
VAULTER III	1-300	1-75	LB (2-6) HB (7-13) UHF (14-69)	15 15 20	5.0 5.0 3.5
VAULTER III DUAL	1-300	2-75	LB (2-6) HB (7-13) UHF (14-69)	14 16 18	5.0 5.0 3.3
VAULTER III PLUS	1-300	1-75	LB (2-6) HB (7-13) UHF (14-69)	31 31 38	4.5 4.5 4.5

○ Ordering Information

Model	Stock No.	Description
ABLE U2 III	5118	Consumer Broadband UHF Preamplifier 1-300 Ohm Output
ABLE U2 III 75	5119	Consumer Broadband UHF Preamplifier 1-75 Ohm Output
ABLE U2 III 75-75	5219	Consumer Broadband UHF Preamplifier 1-75 Ohm Output
SUBURBAN III	5123	Consumer Broadband VHF/UHF Preamplifier 1-75 Ohm Output
VAULTER III	5124	Consumer Broadband VHF/UHF Preamplifier 1-75 Ohm Output
VAULTER III DUAL	5125	Consumer Broadband VHF/UHF Preamplifier 2-75 Ohm Outputs
VOYAGER III	5122	Consumer Broadband VHF/UHF Preamplifier 1-300 Ohm Output

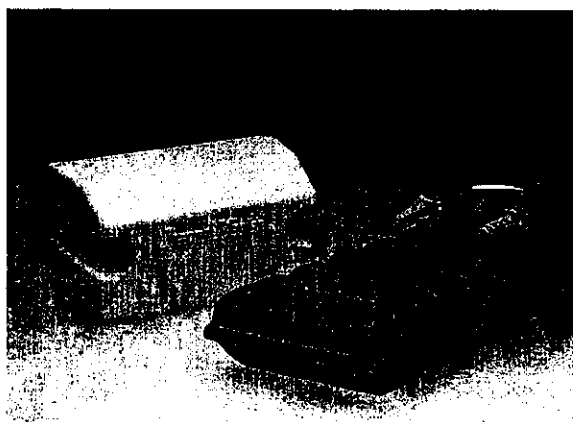
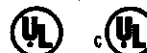
Channel Master LNAs

Preamplifiers

Spartan 3™

Mast Mounted Preamplifiers

- Surface-mounted components for automated production and consistent high performance
- Attractive, modern design for both outdoor unit and power supply
- Easiest installation in the industry
- High gain and ultra low noise figure from the latest generation transistors gives optimum sensitivity
- Separate VHF and UHF amplification plus the use of ultra linear transistors improve output capability for optimum signal handling
- Switchable and tunable FM traps provide full FM control where needed
- Uninterrupted operation even under the harshest environmental conditions
- Full lightning and surge protection
- Cool running, redesigned 117 VAC power supply, Model 0747 is included with each model except Models 0065DSB and 0265DSB. Output voltage is +18 VDC. UL and cUL listed. (Power supply is also available as a separate model.)
- Models 0065 DSB and 0265 DSB are satellite receiver LNB voltage compatible. (+12 to +22 VDC)



SPECIFICATIONS

Model	Inputs	Input Impedance Ohms	Output Impedance/Download Ohms	VHF			UHF			FM Control		
				Gain dB	Noise Figure dB	Output Capability dBmV*	Gain dB	Noise Figure dB	Output Capability dBmV*	Switchable Trap	Tunable Trap	Power Supply
0064 DSB	1 (VHF/UHF)	300	75	16	3.0	56	23	2.2	50	Yes	Yes	0747 Incl.
3041 DSB	1 (VHF/UHF)	300	75	16	3.0	56	23	2.2	50	Yes	No	0747 Incl.
0264 DSB	2 (VHF & UHF)	300	75	16	3.0	56	23	2.2	50	Yes	Yes	0747 Incl.
0068 DSB	1 (VHF/UHF)	75	75	16	3.0	56	23	2.2	50	Yes	Yes	0747 Incl.
0065 DSB	1 (VHF/UHF)	300	75	16	3.0	56	23	2.2	50	Yes	Yes	Not Incl.**
0265 DSB	2 (VHF & UHF)	300	75	16	3.0	56	23	2.2	50	Yes	Yes	Not Incl.**

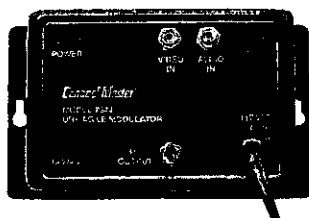
*Output capability is quoted for 2 channels at -46 dB cross modulation. Derate by 5 or 9 dB for 4 or 8 channels per band. Maximum input is output capability minus gain.
 **Ensure the 100 mA current draw will not overload the satellite receiver. See Titan™ Model 7776 for Spartan 3™ features in the Titan™ die-cast housing.

UHF Agile Modulator

MODEL 7644

- PLL frequency synthesized
- Set channel with DIP Switches
- Ideal for DBS satellite receivers, security cameras
- Output frequency may be set in 1 MHz increments, allowing CATV as well as off-air channel plans.

FCC Certified



SPECIFICATIONS

UHF Channel Range	14-50
Frequency Range	471.25 to 687.25 MHz
Output Level	+14 dBmV
Modulation Type	NTSC Double Sideband AM
Output Impedance/Connector	75 ohms, Type F
VIDEO	
Input Level	+14 dB
Input Impedance	75 ohms
Frequency Response	30 Hz - 4.2 MHz
Input Connector	RCA Phono
AUDIO	
Input Level	200 mV rms
Input Impedance	10 k ohms
Frequency Response	50 Hz to 15 kHz
Subcarrier Frequency	4.5 MHz
Subcarrier Level	Video-15 dB
Input Connector	RCA Phono
POWER	
	117 VAC, 60 Hz, 5W

Preamplifiers

TITAN 2™

MATV Mast Mounted Preamplifiers

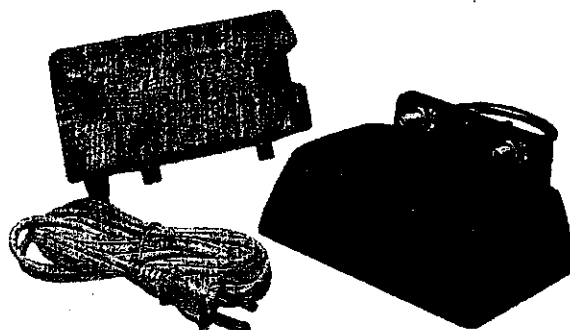
Three models available:

MODEL 7775

- UHF only

Models 7777 and 7778

- VHF and UHF bands with separate amplification in each band for maximum signal handling
- May be configured for either separate or combined VHF and UHF inputs
- Includes a switchable FM trap
- Model 7778 offers Spartan 3™ specifications in the die-cast Titan™ housing



SPECIFICATIONS

MODEL	7775	7777	7778
Number of Inputs*	1(UHF)	1/2(VHF & UHF)	1/2(VHF & UHF)
Input and Output Impedance	75	75	75ohms
Input and Output Connectors	Type F	Type F	Type F
VHF Gain	N/A	23	16dB
VHF Noise Figure	N/A	2.8	3.0dB
VHF Output Capability**	N/A	57	56dBmV
Switchable FM Trap	N/A	Yes	Yes
UHF Gain	26	26	23dB
UHF Noise Figure	2.0	2.0	2.2dB
UHF Output Capability**	51	51	50dBmV

* On Models 7777 and 7778, an internal switch selects either separate or combined VHF and UHF inputs.

** Output capability is quoted for 2 channels at -46 dB cross modulation.

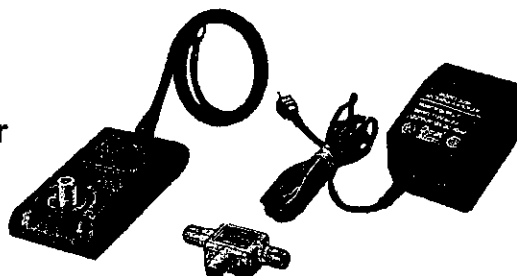
Dedate by 5 or 9 dB for 4 or 8 channels per band. Maximum input is output capability minus gain.

ChannelMax®

UHF/VHF Outdoor Antenna Amplifier

MODEL 3039

- Amplifies weak UHF/VHF television signals
- Increases incoming signal by 20 times
- Consists of antenna boom mounted amplifier, UL/cUL listed power supply, 6' RG59 coaxial cable, weather boot, and tie wrap
- Packaged in a clear, clam shell blister pack for optimum consumer appeal



SPECIFICATIONS

Frequency Range	54-88 MHz 174-806 MHz
Impedance	300 ohm (in), 75 ohm (out)
Gain	13 dB
Noise Figure	3.5 dB
Power Required	117VAC
Output Capability	45 dBmV per ch.(8 chs.)

Preamplifiers

Winegard LNAs

MODEL	INPUT			OUTPUT	AVERAGE GAIN		AVERAGE NOISE		MAXIMUM TOTAL INPUT# (MICROVOLTS)	
	VHF	UHF	82 CH.		VHF	UHF	VHF	UHF	VHF	UHF
AP-2870	75	75		75	17 dB	19 dB	2.9 dB	2.9 dB	10,000 μ V	93,000 μ V
AP-2880	75	75		75	29 dB	19 dB	2.9 dB	2.9 dB	29,000 μ V	93,000 μ V
AP-3700	75	or	75	75	17 dB	By-Passed	2.6 dB	N/A	110,000 μ V	N/A
AP-3800	75	or	75	75	29 dB	By-Passed	2.9 dB	N/A	29,000 μ V	N/A
AP-4700		75 or	75	75	By-Passed	19dB	NA	2.9dB	N/A	93,000 μ V
AP-4800		75 or	75	75	By-Passed	28 dB	N/A	2.7 dB	N/A	30,000 μ V
AP-8275			75	75	29 dB	28 dB	2.9 dB	2.8 dB	29,000 μ V	30,000 μ VV
AP-8283			300	75	29 dB	28 dB	2.9 dB	2.8 dB	29,000 μ V	30,000 μ V
AP-8700			75	75	17 dB	19 dB	2.8 dB	2.8 dB	110,000 μ V	93,000 μ V
AP-8703			300	75	17 dB	19 dB	3.9 dB	3.9 dB	110,000 μ V	93,000 μ V
AP-8733	300	300		75	17 dB	19 dB	3.9 dB	3.9 dB	110,000 μ V	93,000 μ V
AP-8780			75	75	17 dB	28 dB	2.9 dB	2.7 dB	110,000 μ V	30,000 μ V
AP-8783			300	75	17 dB	28 dB	3.9 dB	3.9 dB	110,000 μ V	30,000 μ V
AP-8800			75	75	29 dB	19 dB	2.7 dB	2.8 dB	29,000 μ V	93,000 μ V
AP-8803			300	75	29 dB	19 dB	3.9 dB	3.9 dB	29,000 μ V	93,000 μ V
AP-8833	300	300		75	29 dB	19 dB	3.9 dB	3.9 dB	29,000 μ V	93,000 μ V

Exhibit 3

Rotors

ANTENNA-CRAFT

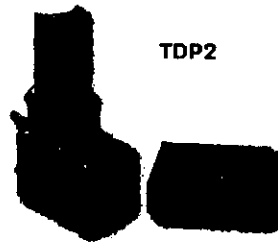
America's Top Producer of HDTV / VHF / UHF Antennas

ANTENNA PRODUCTS

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TDP2 TV/FM Antenna Rotator

Dependable and reliable, this is the standard the TV industry goes by! For traditionalists everywhere, the TDP2 simplified multi-channel reception.



TDP2

Fully Automatic,
heavy-duty motor
handles
large antenna with
plenty of torque to
break thru heavy ice
loads

Strong, machine-cut
gears that won't bind

Brake pads hold firm to
prevent high wind
damage (tested to 70
mph)

2 synchronized motors
give exact degree of
station location

One piece high alloy
aluminum construction
assures total
weather protection

Gold, corrosion-
resistant coated

Holds masts up
to 2" diameter

Requires 3-wire
rotator cable

UL listed,
AC operation

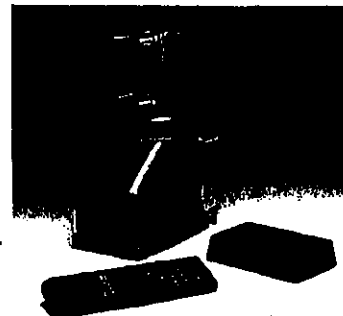
List Price \$94.88

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Antenna Rotators

A Rotor or Rotator is a mast-mounted, motor-driven device that permits the TV viewer to conveniently rotate (orient) the outdoor antenna in any direction to optimize reception of a desired TV channel. A rotor should be considered when TV signals are being broadcast from towers in different directions and a single antenna can not accommodate all locations.

A rotator consists of two parts: 1) an indoor control unit, and 2) an outdoor drive unit. The two are connected via a 3-conductor wire that carries the voltage and control signals from the indoor unit to the outdoor drive unit.



Channel Master manufactures a remote control unit, model 9521A. A separate indoor controller, model 9537 is also available and is compatible with the following rotator systems: 9500, 9510, 9510A, 9512, 9513, 9515, 9515A, and Radio Shack 15-1225. Model 9537 is the indoor controller and handheld remote control. This model may be added to an existing manual rotator system and instantly upgrades the system to the remote control version.

Antenna Rotator Controller with Infra-Red Remote Control

The Complete System

Model 9521A —Controller, Handheld, and Drive Unit

Handheld Unit and Controller Only

Model 9537 —Instantly upgrade a manual system to remote by simply replacing current manual controller with Model 9537. Model 9537 is a perfect upgrade for Models 9500, 9510(A), 9512, 9513, 9515(A), and Radio Shack 15-1225.

Control Unit Features

- Compatible with Most Universal Remote Controls (Including Satellite)
- 69 Channel Programmable Memory
- Non-Volatile Memory — Holds Locations during Power Failures
- Automatic Synchronization Ensures Pinpoint Accuracy
- Direct Access via TV Channel Number or Digital Compass Location
- Unobtrusive Control Blends with any Décor

Drive Unit Features

- One-Piece Cast Aluminum Housing
- Heavy Duty Rotator Motor
- Wind-Tested Brake Pads
- Durable Powder-Coat Paint Finish
- Precision-Cut Gear System
- Built-In Steel Thrust Bearings

SPECIFICATIONS

Rotation 1RPM

Gear Ratio 3200 to 1

Max. Masting 2"

Max. Vertical Load 250 lbs.

Max. Balanced Windload Area 3 sq. ft.

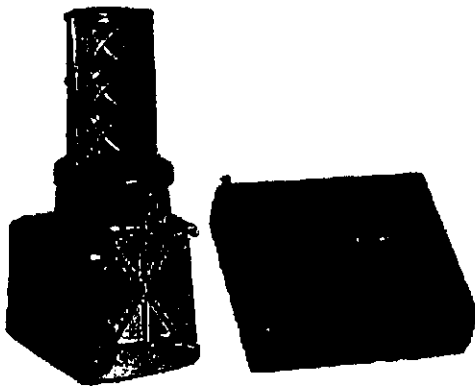
117V 60 Hz Rotator and Control Unit
(230V 50 Hz Units: 9521EU and 9537EU)

360° Outdoor Antenna Rotator**\$74.99**

Catalog #: 15-1245

Brand: RadioShack

Model: 15-1245

FREE SHIPPING **Protect Your
Investment
[Learn How](#)**

Availability	On-line: In-stock	In Store: Check availability
	Phone: In-stock 1-800-THE-SHACK (1-800-843-7422)	

(Pricing and availability may vary outside the contiguous 48 United States.)

With the Outdoor Antenna Rotator you can accurately position your antenna for the best possible TV and FM reception—perfect for suburban and rural areas. It automatically turns your antenna to the direction you dial in on the control panel, and then shuts off when it reaches the desired position.

Need Related Products?
Check the products that you would like added to the cart and then click the Add to Cart or Update Cart button.



100-Ft. Rotator
Control Cable
15-1150

\$14.99**PRODUCT FEATURES**

- The heavy-duty construction handles large antennas and masts from 1-1/3 to 1-3/4 inches in diameter
- The Outdoor Antenna Rotator is also ideal for Ham and other amateur radio antennas
- For use with 3-wire rotator cable (#15-1150)
- Includes mounting hardware
- Includes channel labels for marking the best reception points for each channel
- Handles masts from 1-1/3 to 1-3/4 inches in diameter
- Rotation time 360°: 65 (± 5) seconds (at 60Hz)
- Rotation torque: 160 inch-pounds
- Vertical load: 99 pounds maximum
- Thrust bearing: Handles loads up to 250 pounds maximum
- Gear ratio: 3100 (± 100) to 1
- Wind load braking system: Up to 70mph
- Power source: 120VAC, 62W, 60Hz, 0.52A
- Motor: 18VAC (2.35A)
- UL Listed

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Remote Rotator Controller with Infrared Signal

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PRODUCT FEATURES
• Indicator on the remote displays antenna direction
• Remote rotator controller with infrared signal
• Includes handheld unit and controller; rotator not included

Monday, June 13, 2005 5:48:18 PM

**Before the
Federal Communications Commission
Washington, D.C. 20554**

DRAFT

In the matter of)	
)	
Re Technical Standards for Determining)	ET Docket No. 05-182
Eligibility for Satellite-Delivered Network)	
Signals Pursuant to the Satellite Home)	
Viewer Extension and Reauthorization Act)	

To: The Commission

**COMMENTS OF
THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.**

The Association for Maximum Service Television, Inc. ("MSTV")¹ files these comments and the corresponding Engineering Statement² to address some of the important issues raised by the Commission's Notice of Inquiry (the "NOI") for determining eligibility for satellite-delivered network signals pursuant the Satellite Home Viewer Extension and Reauthorization Act (SHVERA).³

The NOI is seeking comments on the adequacy of the digital signal strength standard and testing procedures used to determine whether households are eligible to

¹ MSTV represents nearly 500 local television stations on technology and spectrum policy issues relating to analog and digital television services.

² *Infra*, Ex.1, du Treil, Lundin & Rackely, Inc., *Engineering Statement in Support of Comments of the Association for Maximum Service Television, Inc., in Response to the Notice of Inquiry in the Matter of Technical Standards for Determining Eligibility for Satellite-Delivered Network Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act*. ET Docket No. 05-182.

³ Notice of Inquiry, *In re Technical Standards for Determining Eligibility for Determining Satellite-Delivered Network Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act (SHVERA)*, ET Docket 05-182, FCC 05-1794 (rel. May 18, 2005).

receive distant digital television (DTV) network signals from satellite communication providers. Specifically, the Commission is seeking comments and information on whether the signal strength standards of 47 CFR 73.622(e) and the measurement procedures of 47 CFR 73.686(d) should be amended for the purpose of identifying if a household is underserved by a digital television signal and thus eligible for reception of a retransmitted distant network signal.

MSTV urges the Commission to reaffirm the digital signal strength standards listed in Section 73.622(e) of the rules for determining service availability for DTV and thus identifying underserved households eligible for SHVERA. These standards -- grounded on sound engineering principles, are based on a set of planning factors recommended by the FCC Advisory Committee Television Services and subsequently adopted by the Commission.⁴ These factors have been in use for almost a decade and have been proven in the field to be appropriate for determining service availability for DTV. Moreover, the attached Engineering Statement prepared by the firm of du Treil, Lundin and Rackley, Inc. have re-examined the premise for these planning factors and provided further evidence to demonstrate that the planning factors established a decade ago are achievable and are an appropriate metric for predicting DTV service under the terms of SHVERA.

⁴ From *The Sixth Report and Order*, Appendix A, *Advanced Television Systems and their Impact upon the Existing Television Broadcast Service*, MM Docket No. 87-268, FCC 97-115.

CONCLUSION

For the reasons explained above, the Commission should not change the strength standards listed in Section 73.622(e) of the rules for determining service availability for DTV and use these standards to identify underserved households eligible for SHVERA.

Respectfully submitted,

ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.

/s/David Donovan

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June 17, 2005

ENGINEERING STATEMENT
IN SUPPORT OF COMMENTS OF THE
ASSOCIATION FOR MAXIMUM SERVICE TELEVISION
IN RESPONSE TO THE NOTICE OF INQUIRY IN THE MATTER OF
TECHNICAL STANDARDS FOR DETERMINING ELIGIBILITY FOR
SATELLITE-DELIVERED NETWORK SIGNALS PURSUANT TO THE SATELLITE
HOME VIEWER EXTENSION AND REAUTHORIZATION ACT
ET DOCKET NO. 05-182

1. Introduction

This engineering statement was prepared on behalf the Association for Maximum Service Television ("MSTV") in support of its comments in response to the FCC's Notice of Inquiry ("NOI") in the matter of *Technical Standards for Determining Eligibility For Satellite-Delivered Network Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act* ("SHVERA"), ET Docket No. 05-182. In the NOI, the Commission sought comments and information on whether the signals strength standards of 47 CFR 73.622(e) and the measurement procedures of 47 CFR 73.686(d) should be amended for the purpose of identifying if a household is unserved by a digital television signal and thus eligible for reception of a retransmitted distant network signal.

For the purposes of predicting whether a household is unserved by a DTV signal, MSTV believes that the Commission should not change the signal strength standards of 47 CFR 73.622(e). These standards were established in the Sixth Report and Order in MM Docket No. 87-268, Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, FCC 97-115 (herein "DTV Sixth R&O"), and incorporated into Rule Section 73.622(e). As the NOI indicates, the signal strengths specified in Section 73.622(e) are expressed as the electric field strengths necessary at a receiving antenna to provide a signal sufficient to overcome the thermal and receiver noise present within the 6 MHz DTV channel to provide an acceptable picture on a DTV receiver, and thus they are termed the "noise-limited field strengths."

The noise limited field strength values listed in Section 73.622(e) are based on a set of planning factors recommended by FCC Advisory Committee on Advanced Television Service and are listed in Appendix A of the DTV Sixth R&O. This engineering statement reviews the bases for these planning factors and provides examples of specifications for available equipment demonstrating that the planning factors remain an appropriate means of defining digital television service availability.

2. DTV Planning Factors

The DTV planning factors, as listed in the DTV Sixth R&O, are provided in Table 1 below. Following the table are detailed descriptions of each factor including a summary of the parameters upon which each factor is based.

Table 1 – DTV Planning Factors ¹				
Planning Factor	Low VHF	High VHF	UHF	Units
	Ch. 2-6	Ch. 7-13	Ch. 14-69	
Geometric Mean Frequency	69	194	615	MHz
Dipole Factor (dBm-dBu)	-111.8	-120.8	-130.8	dB
Thermal Noise	-106.2	-106.2	-106.2	dBm
Antenna Gain	4	6	10	dBd
Downlead Line Loss	1	2	4	dB
Antenna front-to-back ratio	10	12	14	dB
Receiver Noise Figure	10	10	7	dB
Time Probability Factor (90% Availability)	0	0	0	dB
Location Probability Factor (50% Availability)	0	0	0	dB
C/N Ratio	15.2	15.2	15.2	dB
Noise-Limited Field Strength	28	36	41	dBuV/m, f(50,90)

The DTV planning factors were listed in an alternate form in the Satellite Home Viewer Improvement Act (SHVIA) proceedings². So that there is no confusion, where appropriate we provide an explanation of the differences in form. No matter which form

¹ From *Sixth Report and Order*, Appendix A, *Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, MM Docket No. 87-268, FCC 97-115.

² See *Report*, *Technical Standards for Determining Eligibility for Satellite-Delivered Network Signals Pursuant to the Satellite Home Viewer Improvement Act*, ET Docket No. 00-90, FCC 00-416.

is used to express the DTV planning factors, the noise-limited field strengths calculated from them are the same.

2.1 Use of Geometric Mean Frequency

For DTV planning purposes, a frequency dependent dipole factor was calculated for the three television bands (Low VHF, High VHF and UHF) based on the geometric mean of the frequencies at the upper and lower edges of each band. The geometric mean frequency was then used to calculate a single dipole factor for each of the three television bands, thus simplifying the planning process by eliminating the need to separately calculate a dipole factor for each DTV channel. Absent this policy, the calculated noise-limited signal strengths would vary in a frequency-dependent manner from channel to channel across the entire band. The use of the geometric mean frequency is reasonable for planning purposes as differences between the dipole factor as calculated based on the geometric mean frequency and that calculated based on the center frequency of the actual channels are small (1 to 2 dB, depending on band).

2.2 Dipole Factor

The dipole factor expresses the quantitative relationship between the power or voltage present at the terminals of a half-wave dipole antenna which is immersed in an electric field of known strength. The DTV Sixth R&O expresses the dipole factor in logarithmic form as the relationship between electric field strength and power. The SHVIA Report expresses the dipole factor in logarithmic form as the relationship between electric field strength and voltage. Both the DTV Sixth R&O and the SHVIA Report assume a 75-ohm load. It is important to note that no substantive differences arise from the variation in the form of expressing the dipole factor.

2.3 Thermal Noise

For the DTV planning factors, thermal noise is calculated based on a 6 MHz-wide channel and assumed temperature of 290K. The DTV Sixth R&O expresses it in logarithmic terms as power in decibels relative to a milliwatt. The SHVIA Report expresses it in logarithmic terms as voltage in decibels relative to a microvolt, assuming a 75-ohm impedance.

We note that the DTV Sixth R&O correctly reports the thermal noise at -106.2 dBm. When expressed in terms of voltage in units of dB/1 μ V for a 75-ohm

impedance the value is 2.56 dB/1 μ V. It is not known why the thermal noise is reported as 1.75 dB/1 μ V in the SHVIA Report. The 0.81 dB of difference does not result in a change in the noise-limited field strengths in the SHVIA Report due to the fact that the SHVIA Report adjusts the Carrier-to-Noise ratio by 0.8 dB (15.2 to 16 dB) from that used in the DTV planning factors in the DTV Sixth R&O. This compensates for the difference in the reported thermal noise figure.

2.4 Antenna Gain and Downlead Line Loss

In both the DTV Sixth R&O and the SHVIA Report, the presumed antenna gains are expressed in decibels relative to a half-wave dipole and the downlead line losses are expressed based on assumed use of 50 feet of typical 75-ohm coaxial cable.

2.5 Antenna Front-to-Back Ratio

The antenna front-to-back ratio, which is listed in the DTV Sixth R&O (but is not listed in the SHVIA Report) does not enter into the calculations of the noise limited field strengths. It is, however, pertinent to issues of interference from undesired signals, and it is used in the process of allotting DTV channels. The antenna front-to-back ratio expresses the assumed difference between the maximum antenna gain (for an antenna properly oriented toward a desired station) and the gain for the antenna in the opposite direction (180°) to its maximum gain.

2.6 Receiver Noise Figure

The receiver noise figure expresses, in logarithmic terms, the increase in overall noise (above thermal noise) due to internal receiver circuitry. The figures are based on tests conducted on the Grand Alliance system (the 8-VSB system adopted by the FCC for US digital television) at the Advanced Television Test Center and are reported in the "Final Technical Report" of the Technical Subgroup of the FCC Advisory Committee on Advanced Television Service, October 30, 1995.

2.7 Time and Location Probability Factors

For the purpose of predicting the limit of DTV service, the time and location probability factors that were adopted are the same as the planning factors used for the Grade B analog (NTSC) television signal, namely a signal predicted to be received at 50 percent of the locations, 90 percent of the time. Unlike the analog Grade B planning

factors, however, no adjustment was made to the DTV noise limited field strengths in terms of a median field (50 percent of the locations, 50 percent of the time) as was done with the Grade B field strength. Rather, the noise limited field strengths for DTV service are expressed as fields received at 50 percent of the locations, 90 percent of the time.

When predicting DTV service based on the noise limited field strength, the prediction model takes into account both the time and location probability factors. Therefore, the values of both factors are 0 dB when predicting the field strengths.

2.8 Carrier-to-Noise (C/N) Ratio

The carrier-to-noise (C/N) ratio is also based on testing done on the Grand Alliance system at the Advanced Television Test Center. The 15.2 dB figure listed in the DTV Sixth R&O expresses the minimum ratio of the desired carrier power to noise power necessary to produce an acceptable DTV picture. In the SHVIA Report, this figure is listed as 16 dB. However, since the SHVIA Report understates the thermal noise by 0.81 dB (see Section 2.3), the net result is no change in the noise-limited field strengths.

3. Applicability of Planning Factors to Equipment Available for Purchase and Installation

For the purpose of evaluating whether the noise limited field strengths, developed based on the DTV planning factors, are still valid based on performance of available receiving equipment, we provide the following information comparing the applicable DTV planning factor values to the values of those factors as specified by manufacturers for equipment that is presently available for purchase and installation.

3.1 Antenna Gain and Front-to-Back Ratio

The planning factors for antenna gain and front-to-back ratio were for outdoor antennas. A search of web sites for suppliers and manufacturers of outdoor antennas reveals the following partial list of antennas (see Table 2) that meet or exceed the antenna gain and front-to-back ratio values contained in the DTV planning factors. The gain and front to back ratios shown in Table 2 were obtained from information produced by the manufacturers and/or equipment suppliers.

Table 2 – Specifications from Manufacturers of Outdoor Receiving Antennas				
Frequency Band	Manufacturer	Antenna Model	Antenna Gain (dBd)	Antenna Front-to-Back Ratio (dB)
Low VHF	Antennacraft	CS-1100	6.9	19.4
	Channel Master (Andrew)	Crossfire Model 3671	5.6 (Band Average) 4.9 (min. Ch 2) 6.2 (max. Chs 5,6)	24 (minimum across band)
	Winegard	Prostar 1000 Model PR-5030	5.0 (min. Ch 4) 7.0 (max. Ch 6)	19 (min. Ch 2)
High VHF	Antennacraft	CS-1100	9.6	17.6
	Channel Master (Andrew)	Crossfire Model 3671	10.9 (Band Average) 9.5 (min. Ch13) 11.5 (max. Ch 8)	14 (minimum across band)
	Winegard	Prostar 1000 Model PR-5030	7.5 (min. Ch 7) 9.5 (max. Ch 9)	13 (min. Ch 7) >20 (max. Ch 4,6)
UHF (Channels 14 –51)	Antennacraft	MXU-59	10.7	17.0
	Channel Master (Andrew)	UHF Model 4228	10.8 (min. Ch 14) 12.7 (max. Ch. 43)	19 (min. Ch 35) 24 (max. Ch. 43)
	Winegard	Prostar 1000 Model 9032	14.9 (min. Ch 14) 16.3 (max. Ch 32)	14 (min. Ch 14) 20 (max. Ch 32,50)

As can be seen in Table 2, with respect to both the antenna gain and antenna front-to-back ratio, the data indicate that there are a number of receiving antennas available on the market that exceed the DTV planning factors.

As an aide in reception, mast-mounted, low-noise pre-amplifiers are available which can further enhance system gain. For reference, relevant specifications for three models are listed in Table 3.

Table 3 – Specifications from Manufacturers of Mast-Mounted Preamps				
Frequency Band	Manufacturer	Amplifier Model	Amplifier Gain (dB)	Amplifier Noise Figure (dB)
VHF	Antennacraft	10G202	29 (avg VHF/UHF)	<3.0 (VHF)
	Channel Master (Andrew)	Titan 2 Model 7777	23	2.8
	Winegard	Chromstar 2000 Model AP-2880	29	2.9

Table 3 – Specifications from Manufacturers of Mast-Mounted Preamps				
UHF	Antennacraft	10G202	29 (avg VHF/UHF)	<2.6 (UHF)
	Channel Master (Andrew)	Titan 2 Model 7777	26	2.0
	Winegard	Chromstar 2000 Model AP-2880	19	2.9

When the improvements in system noise figure (see Section 3.3 below) resulting from implementation of a mast-mounted preamplifier are taken into account, it is possible to meet the planning factor gain figures even when using antennas with passive gains less than the planning factor values.

3.2 Downlead Line Loss

The line loss values contained in the DTV planning factors are based on 50 feet of 75-ohm coaxial cable. The planning factor values appear reasonable based on the published attenuation values for 75-ohm RG-6 coaxial cable. Table 4 provides specifications from three different coaxial cable manufacturers. In all three cases, the attenuation values assumed in the DTV planning factors exceed that of available products. In other words, the DTV planning factors use conservative estimates of transmission loss.

Table 4 – Specifications from Manufacturers of Coaxial Cable (75 ohm)				
Frequency	Manufacturer	Cable Type and Model	Attenuation (dB/100 ft)	Attenuation (50 feet of cable)
69 MHz (Low VHF)	Belden	RG 6/U Model 9116	1.71	0.86
	Channel Master	RG6 9533-500	1.79	0.90
	Coleman	RG 6/U Model 992127	1.9	0.95
194 MHz (High VHF)	Belden	RG 6/U Model 9116	2.73	1.37
	Channel Master	RG6 9533-500	2.89	1.45
	Coleman	RG 6/U Model 992127	3.2	1.6
615 MHz (UHF)	Belden	RG 6/U Model 9116	5.00	2.50
	Channel Master	RG6 9533-500	5.57	2.79

Table 4 – Specifications from Manufacturers of Coaxial Cable (75 ohm)

	Coleman	RG 6/U Model 992127	6.2	3.1
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3.3 Receiver Noise Figure

The receiver noise figures used in the planning factors are 10 dB for low-band VHF, 10 dB for high-band VHF and 7 dB for UHF, based upon test data from the Advanced Television Test Center. We have not independently tested a representative sample of DTV receivers, and since the Commission has stated in the NOI that it intends to conduct measurements on DTV receivers, we assume that the Commission will be drawing conclusions regarding the appropriate noise figure values for the purposes of the SHVERA. We note that analog (NTSC) UHF receivers have achieved noise figures in the range of 7 to 8 dB.

It is noted that the overall system noise figure can be significantly reduced with the use of a high-gain, low-noise, mast-mounted pre-amplifier. For example, assuming a mast-mounted, pre-amplifier gain of 19 dB with noise figure of 2.9 dB at UHF frequencies (based on values contained in Table 3), and assuming a download line loss of 4 dB and receiver noise figure of 7 dB per the DTV UHF planning factors, there is a calculated improvement in the overall system noise figure of 7.8 dB.

3.4 Receiver C/N Ratio

Laboratory measurements on various DTV receivers were reported by Bouchard, et al. of the Communications Research Center Canada (CRC) in late 2000.³ These measurements demonstrated C/N levels consistent with the FCC planning factor of 15.2 dB. The measurements were conducted on six DTV receivers manufactured in the period of 1999-2000. For a weak desired signal level, the results demonstrated a C/N range of 15.3 dB to 17.8 dB, with a median C/N of 15.6 dB. The five best out of the six had a C/N of 15.3 dB to 16.7 dB, with a median C/N of 15.4 dB. The worst performing receiver was the oldest of the population measured.

Recent laboratory measurements on a “fifth generation” DTV receiver also show C/N measurement results consistent with the FCC planning factor. Laboratory measurements were conducted by the CRC on the latest Zenith receiver in September

³ See Bouchard, Pierre, et al., “Digital Television Test Results – Phase 1”, Communications Research Center (Ottawa, Canada), *CRC Report No. CRC-RP-2000-11*, November 2000.